

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): A titanium alloy member comprising

40% by weight or more of titanium (Ti),

a IVa group element other than titanium as a first substitutional element,

a Va group element as a second substitutional element, and

0.25 to 2.0% by weight of one or more interstitial elements selected from the group consisting of oxygen (O), nitrogen (N) and carbon (C), wherein

the titanium alloy member contains a summed amount of the Va group element, the IVa group element other than titanium, and the titanium of 90% by weight or more;

the titanium alloy member has a composition in which

a compositional mean value of the substitutional elements is $2.43 < \text{Md} < 2.49$

with regard to the energy level "Md" of the d-electron orbit and

a compositional mean value of the substitutional elements is $2.86 < \text{Bo} < 2.90$

with regard to the bond order "Bo", where the "Md" and the "Bo" are each a parameter obtained by the "DV-X α " cluster method;

the titanium alloy member is subjected to cold-working;

the titanium alloy member comprises grains having a body-centered tetragonal or a body-centered cubic crystal structure, in which a ratio (c/a) of a distance between atoms on the c-axis with respect to a distance between atoms on the a-axis falls in a range of from 0.9 to 1.1;

the titanium alloy member has a texture such that, when a polar figure of the (110) or (101) crystal plane of the grains is measured parallel to a working direction, in ranges of $20^\circ < \alpha' < 90^\circ$ and $0^\circ < \beta < 360^\circ$ by the Schulz reflection method,

$(\nu 2/Xm^2)$ is 0.3 or more, and

(σ $\sqrt{3/Xm^3}$) is 0.3 or more, where

$$\sigma_2 = \{\sum (X-Xm)^2\}/N,$$

$$\sigma_3 = \{\sum (X-Xm)^3\}/N, \text{ and}$$

Xm is the mean value of N measurement values X; and

the titanium alloy member has a tensile deformation property such that a gradient of the tangential line in a stress-strain diagram obtained by a tensile test within an elastic deformation range, in which the stress ranges from 0 to the tensile elastic limit strength, decreases continuously with increase in stress.

Claim 2 (Previously Presented): The titanium alloy member set forth in claim 1,

exhibiting a dislocation density of $10^{11}/\text{cm}^2$ or less when cold working is carried out by 50% or more.

Claim 3 (Previously Presented): The titanium alloy member set forth in claim 1,

including the one or more interstitial elements in a summed amount of from 0.6 to 1.5% by weight.

Claim 4 (Currently Amended): A process for making a titanium alloy member, the process comprising:

preparing a raw material;

forming the raw material;

carrying out cold-working; and

producing the titanium alloy member of Claim 1.

Claim 5 (Previously Presented): The process set forth in claim 4, wherein the raw material comprises a powder; and the forming comprises sintering the raw material.

Claim 6 (Previously Presented): The process set forth in claim 4, further comprising manufacturing an ingot from the raw material.

Claim 7 (Canceled)

Claim 8 (Currently Amended): The process set forth in ~~claim 7~~ claim 5, wherein in the cold-working a cold-working ratio is 10% or more; and the process further comprises age-treating the cold-worked material so that the Larson-Miller parameter P falls in a range of from 8.0 to 18.5 at a treatment temperature falling in a range of from 150°C to 600°C.

Claim 9 (Previously Presented): The process set forth in claim 8, wherein P falls in a range of from 8.0 to 12.0 and the treatment temperature falls in a range of from 150°C to 300°C; and the titanium alloy member obtained after the age-treating has a tensile elastic strength of 1,000 MPa or more, an elastic deformation capability of 2.0% or more and a mean Young's modulus of 75 GPa or less.

Claim 10 (Previously Presented): The process set forth in claim 8, wherein P falls in a range of from 12.0 to 14.5 and the treatment temperature falls in a range of from 300°C to 600°C; and

the titanium alloy member obtained after the age-treating has a tensile elastic strength of 1,400 MPa or more, an elastic deformation capability of 1.6% or more and a mean Young's modulus of 95 GPa or less.

Claims 11-14 (Canceled).

Claim 15 (Previously Presented): The process set forth in claim 6, further comprising cold-working the ingot.

Claim 16 (Previously Presented): The process set forth in claim 15, wherein in the cold-working a cold-working ratio is 10% or more; and

the process further comprises age-treating the cold-worked material so that the Larson-Miller parameter P falls in a range of from 8.0 to 18.5 at a treatment temperature falling in a range of from 150°C to 600°C.

Claim 17 (Previously Presented): The process set forth in claim 16, wherein P falls in a range of from 8.0 to 12.0 and the treatment temperature falls in a range of from 150°C to 300°C; and

the titanium alloy member obtained after the age-treating has a tensile elastic strength of 1,000 MPa or more, an elastic deformation capability of 2.0% or more and a mean Young's modulus of 75 GPa or less.

Claim 18 (Previously Presented): The process set forth in claim 16, wherein P falls in a range of from 12.0 to 14.5 and the treatment temperature falls in a range of from 300°C to 600°C; and

the titanium alloy member obtained after the age-treating has a tensile elastic strength of 1,400 MPa or more, an elastic deformation capability of 1.6% or more and a mean Young's modulus of 95 GPa or less.

SUPPORT FOR THE AMENDMENT

This Amendment cancels Claim 7; and amends Claims 1, 4 and 8. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claim 1 is found at least in canceled Claim 7. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-6, 8-10 and 15-18 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

The present invention provides a titanium alloy member with superior cold working properties, a low Young's modulus and high strength. The titanium alloy of the present invention includes an unprecedented large amount of O, N or C, is remarkably tough and shows a high elastic deformation capability. As a result of the present invention, the necessity for strictly controlling the oxygen content in titanium alloys has been obviated. Specification at page 14, lines 7-9. In contrast to conventional titanium alloy, the titanium alloy member of the present invention has a stress-strain curve that is not linear in the low strain, elastic deformation range, but instead has a gradient (i.e., slope) that continuously decreases along the stress-strain curve with increasing strain. The present invention is not restricted by any manufacturing method (an ingot method, a sintering method). As shown in the attached Declaration Under 37 C.F.R. § 1.132, cold-working promotes the appearance of non-linear stress-strain properties in the titanium alloy member of the present invention.

Claims 1-3, 4, 6 and 15 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,871,595 ("Ahmed"). Applicants thank the Examiner for the indication that Claims 5, 7-10

and 16-17 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Final Rejection at page 4, section 4. The "cold-working" limitation of allowable Claim 7 is incorporated into independent Claim 1 and into Claim 4. Ahmed fails to suggest the "cold-working" limitation. Thus, pending Claims 1-6, 8-10 and 15-18 are allowable.

In view of the foregoing amendment and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Attachment: Declaration Under 37 C.F.R. § 1.132

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